

### *Amendments to the Claims*

This listing of claims will replace all prior versions, and listings of claims in the application.

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1. (Currently Amended) A method for precise feedback data generation and updating during compile-time optimizations, within an optimizing compiler, comprising:
    - (1) accessing a first intermediate representation of source code of a computer program, wherein said first intermediate representation includes instructions instrumented into the source code of said computer program;
    - (2) annotating said first intermediate representation with previously-gathered ~~numerical feedback~~ frequency data from a plurality of sample executions of said computer program;
    - (3) updating said ~~numerical feedback~~ frequency data according to a pre-defined propagation scheme;
    - (4) performing an optimization of said first intermediate representation annotated with said ~~numerical feedback~~ frequency data updated in step (3), thereby producing a transformed intermediate representation; and
    - (5) repeating steps (3) and (4) at least once during the same compilation pass.
  2. (Original) The method of claim 1, wherein step (4), comprises the step of performing at least one of the following optimizations:
    - (i) dead code elimination;
    - (ii) dead store elimination;
    - (iii) branch elimination; and
    - (iv) code transformation.
  3. (Original) The method of claim 1, wherein said first intermediate representation is a tree corresponding to a procedure within the source code of said computer program.
  4. (Original) The method of claim 3, wherein step (2), comprises the steps of:

(a) constructing a control flow graph from said tree; and  
(b) annotating a frequency value to an edge of said control flow graph,  
wherein said frequency value corresponds to the number of times that said edge was  
traversed during said plurality of sample executions of said computer program.

5. (Original) The method of claim 4, wherein said frequency value annotated to  
said edge of said control flow graph is one of the following:

- (i) EXACT;
- (ii) GUESS;
- (iii) UNKNOWN;
- (iv) UNINIT; and
- (v) ERROR.

6. (Currently Amended) A computer program product comprising a computer  
usable medium having computer readable program code means embodied in said  
medium for causing an application program to execute on a computer that performs  
precise feedback data generation and updating during compile-time optimizations, within  
an optimizing compiler, said computer readable program code means comprising:

first computer readable program code means for causing the computer to access a  
first intermediate representation of source code of a computer program, wherein said first  
intermediate representation includes instructions instrumented into the source code of  
said computer program;

second computer readable program code means for causing the computer to  
annotate said first intermediate representation with previously-gathered ~~numerical~~  
~~feedback~~ frequency data from a plurality of sample executions of said computer  
program;

third computer readable program code means for causing the computer to update  
said ~~feedback~~ frequency data according to a pre-defined propagation scheme;

fourth computer readable program code means for causing the computer to  
perform an optimization of said first intermediate representation annotated with said  
~~numerical feedback~~ frequency data updated by said third computer readable program  
code means, thereby producing a transformed intermediate representation; and

fifth computer readable program code means for causing the computer to re-execute said third and fourth computer readable program code means at least once during the same compilation pass.

7. (Original) The computer program product of claim 6, wherein said first intermediate representation is a tree corresponding to a procedure within the source code of said computer program.

8. (Original) The computer program product of claim 7, wherein said second computer readable program code means comprises:

sixth computer readable program code means for causing the computer to construct a control flow graph from said tree; and

seventh computer readable program code means for causing the computer to annotate a frequency value to an edge of said control flow graph, wherein said frequency value corresponds to the number of times that said edge was traversed during said plurality of sample executions of said computer program.

9. (Previously Amended) A method for compile-time optimization comprising:

(1) accessing a first intermediate representation of source code of a computer program, wherein the first intermediate representation includes instructions instrumented into the source code;

(2) annotating the first intermediate representation with previously-gathered global and local frequency data from a plurality of sample executions of the computer program;

(3) updating the global and local frequency data according to a pre-defined propagation scheme;

(4) performing an optimization of the first intermediate representation annotated with the global and local frequency data updated in step (3) to produce a transformed intermediate representation; and

(5) repeating steps (3) and (4) at least once during the same compilation pass.

10. (Previously Presented) The method of claim 9, wherein step (4) comprises the step of performing at least one of the following optimizations:

- (i) dead code elimination;
- (ii) dead store elimination;
- (iii) branch elimination; and
- (iv) code transformation.

11. (Previously Presented) The method of claim 9, wherein the first intermediate representation is a tree corresponding to a procedure within the source code.

12. (Previously Presented) The method of claim 11, wherein step (2) comprises the steps of:

- (a) constructing a control flow graph from the tree; and
- (b) annotating a global or local frequency value of the global and local

frequency data to an edge of the control flow graph, wherein the global or local frequency value corresponds to the number of times that the edge was traversed during the plurality of sample executions of the computer program.

13. (Previously Presented) The method of claim 12, wherein the global and local frequency value annotated to the edge of the control flow graph is one of the following:

- (i) EXACT;
- (ii) GUESS;
- (iii) UNKNOWN;
- (iv) UNINIT; and
- (v) ERROR.

14. (Currently Amended) A method for compile-time optimization comprising:

(1) accessing a first intermediate representation of source code of a computer program, wherein the first intermediate representation includes instructions instrumented into the source code;

- (2) annotating the first intermediate representation with previously-gathered ~~feedback~~ frequency data from a plurality of sample executions of the computer program;
- (3) updating the ~~feedback~~ frequency data according to a pre-defined propagation scheme at multiple points during a compilation process;
- (4) performing an optimization of the first intermediate representation annotated with the ~~feedback~~ frequency data updated in step (3) to produce a transformed intermediate representation; and
- (5) repeating steps (3) and (4) at least once during the same compilation pass.

15. (Previously Presented) The method of claim 14, wherein step (4) comprises the step of performing at least one of the following optimizations:

- (i) dead code elimination;
- (ii) dead store elimination;
- (iii) branch elimination; and
- (iv) code transformation.

16. (Previously Presented) The method of claim 14, wherein the first intermediate representation is a tree corresponding to a procedure within the source code.

17. (Previously Presented) The method of claim 14, wherein step (2) comprises the steps of:

- (a) constructing a control flow graph from the tree; and
- (b) annotating a global or local frequency value of the global and local frequency data to an edge of the control flow graph, wherein the global or local frequency value corresponds to the number of times that the edge was traversed during the plurality of sample executions of the computer program.

18. (Previously Presented) The method of claim 17, wherein the global or local frequency value annotated to the edge of the control flow graph is one of the following:

- (i) EXACT;
- (ii) GUESS;
- (iii) UNKNOWN;

- (iv) UNINIT; and
- (v) ERROR.

19. (Previously Presented) The method of claim 17, wherein the global or local frequency value annotated to the edge of the control flow graph is one of the following:

- (i) GUESS; and
- (ii) UNKNOWN.

20. (Currently Amended) A method for compile-time optimization comprising the steps of:

- (1) accessing a first intermediate representation of source code of a computer program, wherein the first intermediate representation includes instructions instrumented into the source code;
  - (2) annotating the first intermediate representation with previously-gathered estimated ~~feedback~~ frequency data from a plurality of sample executions of the computer program;
  - (3) updating the estimated ~~feedback~~ frequency data according to a pre-defined propagation scheme;
  - (4) performing an optimization of the first intermediate representation annotated with the estimated ~~feedback~~ frequency data updated in step (3) to produce a transformed intermediate representation; and
  - (5) repeating steps (3) and (4) at least once during the same compilation pass.
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